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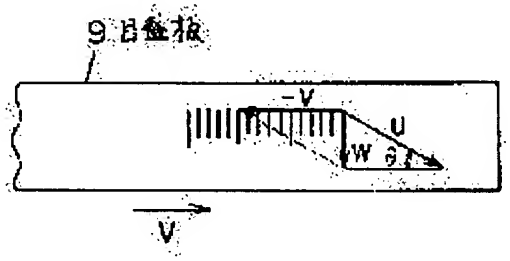
(54) LASER BEAM SCALE MARKING DEVICE

(57)Abstract:

PURPOSE: To reduce man-hour and to prolong the life of the scale plate moving device by reducing the marking man-hour, eliminating the frequent repeating for positioning the scale plate and the frequent start and stop.

CONSTITUTION: In the device for marking the scale line by irradiating the front surface of the scale plate 9 sent in the direction of the scale by a constant speed by the laser beam swing with a scanner, the scanner is moved so that the irradiating place with laser beam is moved in the direction making the angle θ to the direction of the carrying speed V of the scale plate 9 by the speed V/cosθ, the irradiation of the laser beam is started at the time point corresponding to the beginning position of the scale line for marking, and laser beam irradiation is finished after the lapse of time corresponding to the length of the scale line.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The laser graduation attachment equipment characterized by to have the control section which operates said scanner so that it may be equipment which irradiates the laser beam shaken at the front face of the member which is sent in the direction of a graduation with fixed speed, and which should be carried out graduation attachment with a scanner, and carries out marking of the scale mark and the exposure part of said laser beam may move in the direction of delivery speed V of said member, and the direction which makes an include angle theta with the speed of V/cos theta.
[Claim 2] It is equipment which irradiates the laser beam shaken at the front face of the member which is sent in the direction of a graduation with fixed speed, and which should be carried out graduation attachment with a scanner, and carries out marking of the scale mark. So that the exposure part of said laser beam may move in the direction of delivery speed V of said member, and the direction which makes an include angle theta with the speed of V/cos theta Laser graduation attachment equipment characterized by having the control section which terminates this laser beam exposure after the time amount according to the die length of said scale mark while making said laser beam exposure start, when it responds to the starting point location of the scale mark which said scanner should be operated and should carry out it marking.
[Claim 3] It is laser graduation attachment equipment characterized by corresponding to the position signal outputted when the member which should carry out graduation attachment of the initiation event of a laser beam exposure in equipment according to claim 2 arrives at a predetermined location.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the laser graduation attachment equipment which irradiates the laser beam shaken at the front face of the scale member sent in the direction of a graduation with fixed speed with a scanner, and carries out marking of the scale mark.
[0002]
[Description of the Prior Art] It explains referring to the example which starts the below-mentioned invention about the conventional example, and drawing 3 which is a common block diagram. In drawing 3 , the laser beam (YAG laser) by which outgoing radiation was carried out from the laser oscillator 1 is shaken at the surroundings of a shaft by the actuator 4 through the deflection mirror 2 rotated in the minute include-angle range. This shaken laser beam is irradiated by the front face of a dial plate 9 through the ftheta lens 3, and carries out marking of the scale mark here. The ftheta lens 3 is made to irradiate the surface part of a dial plate 9 which biased the laser beam which was a special condenser lens, and it was shaken by the deflection mirror 2 and carried out incidence at the comparatively large include angle according to the incident angle in the state of a focus here. The configuration in which the movable carriage 6 of migration equipment 5 drives by the motor 7, and goes straight on in the direction of an arrow head on the other hand is taken, and a dial plate 9 is fixed on this movable carriage 6. This migration equipment 5 is the so-called X-axis table. Moreover, the location of a movable carriage 6, i.e., the axial location of a motor 7, (angle of rotation) is detected by the encoder 8 connected with the motor 7. A control section 11 controls the delivery location of the direction of a graduation of a dial plate 9, starting of the outgoing radiation of a laser beam and a halt, and the rotation include angle of the deflection mirror 2 by the form associated mutually.
[0003] In the conventional example, it stops, after a movable carriage 6 goes straight on and is positioned in the part according to the graduation location which should be carried out marking, and the laser beam at which only the include angle according to scale mark length is shaken next irradiates a dial plate 9, and marking of the one corresponding graduation is carried out. Positioning of a movable carriage 6 is performed by deciding angle of rotation of a motor 7 by the command of a control section 11 based on the position signal from an encoder 8. That is, repeating rectilinear-propagation migration and a positioning halt, at every halt of the, a laser beam is irradiated and marking of a movable carriage 6, as a result the dial plate 9 is carried out. Of course, since the direction of a deflection of a laser beam is in agreement with the direction of the scale mark, it is as right-angled as the direction of a graduation.
[0004]
[Problem(s) to be Solved by the Invention] In the conventional example, a movable carriage 6, as a result a dial plate 9 repeat rectilinear-propagation migration and a positioning halt, at the time of the halt, a laser beam is irradiated and marking is carried out. Therefore, all activity mandays become large, and since the motion is a frequent repetition of rectilinear-propagation migration and a halt, since the time amount which waits to suppress the oscillation at the time of each halt is needed for one, if migration equipment 5 has a possibility of shortening in one more in a lifting or the life which becomes empty and mechanical wear is put in another way as it, it needs to take antifriction structure to it. Then, this problem will be solved if the method which performs continuously rectilinear-propagation migration of a movable carriage 6, as a result a dial plate 9 can be taken.
[0005] Without canceling the above trouble which a Prior art has and making a scale member halt in each graduation location, the technical problem of this invention is the process continuously sent in the direction of a graduation with fixed speed, and is to offer the laser graduation attachment equipment which irradiates the laser beam shaken at that front face with a scanner, and carries out marking of the scale mark.
[0006]

[Means for Solving the Problem] The laser graduation attachment equipment concerning claim 1 is equipment which irradiates the laser beam shaken at the front face of the member which is sent in the direction of a graduation with fixed speed, and which should be carried out graduation attachment with a scanner, and carries out marking of the scale mark, and it is equipped with the control section which operates said scanner so that the exposure part of said laser beam may move with the speed of V/cos theta in the direction of delivery speed V of said member which should be carried out graduation attachment, and the direction which makes an include angle theta.

[0007] The laser graduation attachment equipment concerning claim 2 on the front face of the member which is sent in the direction of a graduation with fixed speed and which should be carried out graduation attachment So that it may be equipment which irradiates the laser beam shaken with a scanner and carries out marking of the scale mark and the exposure part of said laser beam may move in the direction of delivery speed V of said member which should be carried out graduation attachment, and the direction which makes an include angle theta with the speed of V/cos theta When it responds to the starting point location of the scale mark which said scanner should be operated and should carry out it marking, while making said laser beam exposure start, it has the control section which terminates this laser beam exposure after the time amount according to the die length of said scale mark.

[0008] The laser graduation attachment equipment concerning claim 3 corresponds to the position signal outputted when the member which should be carried out graduation attachment arrives at a predetermined location in equipment according to claim 2 at the initiation event of a laser beam exposure.

[0009]

[Function] With the laser graduation attachment equipment concerning claim 1, a scanner operates by the control section, and since it moves in the direction of delivery speed V of the member which the exposure part of a laser beam should carry out graduation attachment, and the direction which makes an include angle theta with the speed of V/cos theta, to the member which should be carried out graduation attachment, marking of the scale mark is carried out to the direction of a graduation and right angle.

[0010] With the laser graduation attachment equipment concerning claims 2 or 3 In the direction of delivery speed V of the member which a scanner should operate and the exposure part of a laser beam should carry out graduation attachment by the control section, and the direction which makes an include angle theta As opposed to the member which should be carried out graduation attachment since it moves with the speed of V/cos theta Marking of the scale mark is carried out at that direction of a graduation and right angle, and since this laser beam exposure is completed after the time amount according to the die length of the scale mark while a laser beam exposure is started, when it responds to the starting point location of the scale mark which should be carried out marking, a desired location and the scale mark of line length are obtained.

[0011] When the member which should be carried out graduation attachment arrives at a predetermined location, a position signal is outputted, a laser beam exposure is started corresponding to this signal, and the starting point location of the scale mark is decided by the laser graduation attachment equipment concerning especially claim 3.

[0012]

[Example] The example of the laser graduation attachment equipment concerning this invention is explained referring to drawing below. In the field of a configuration, in drawing 3 , it is [rather than it has the direction as right-angled as the direction of a graduation at which a laser beam is shaken by the deflection mirror 2] that this example differs from the conventional example with making a predetermined include angle which is mentioned later, and a control section 10 being used instead of a control section 11. Moreover, that examples differ in respect of the conventional example and actuation is -- as which how to take the timing of ** laser beam outgoing radiation that predetermined relation is realized between the speed of delivery of ** dial plate with which the ** dial plate 9 is continuously sent with a fixed speed, the speed which shakes the deflection mirror 2, and the direction of a deflection is specified. In respect of others, since it is the same as that of the conventional example, explanation is omitted below.

[0013] It explains referring to the mimetic diagram showing actuation of the example of drawing 1 about aforementioned item **. It is U=V/cos theta, when the include angle at which the migration direction of V and the irradiating point of a laser beam makes the speed of delivery of the right of a dial plate 9 with the feed direction of a dial plate is set to theta in drawing 1 and the migration speed is set to U. It is W=Usin theta when the migration direction of the irradiating point of the laser beam to a dial plate 9 will become the direction of a graduation, and a right angle if relation is realized, and relative speed to the dial plate 9 of the irradiating point is set to W. It becomes. In other words, in drawing 1 , composition with the vector [U] which is the passing speed of the irradiating point of a laser beam, and the vector [-V] as an amendment rate which should be added in order to make a scale plate stand it still seemingly (based on a scale plate) serves as a vector [W] which is the passing speed of the relative point over a scale plate irradiating [laser beam].

[0014] Therefore, it is U=V/cos theta while starting a laser beam exposure in the process in which a dial plate is sent by speed V when carrying out marking of a certain scale mark, when the origin of the scale mark comes. Migration of the irradiating point of a laser beam is made to start by theta and speed U whenever [vectorial angle / to satisfy]. Migration of this irradiating point is continued and they are the following time amount Ts. An exposure is stopped behind. Ts = L/W=L/Usin theta (die length which is L:scale mark here)

[0015] Actually, even if it starts migration of the point irradiating [laser beam], speed U is not reached momentarily. Drawing 2 is a timing diagram which shows the relation between the scanner actuation in an example, and laser radiation. In drawing 2 , time amount T is taken along an axis of abscissa, and it is a point (accuracy exposure ideal point) irradiating [laser beam] to an upside. Starting of the laser beam exposure at the bottom to speed u and a halt (turning on and off) are taken. namely, speed u -- T= 0 from -- since there is a certain time lag as shown in drawing until it starts and reaches U -- some allowances -- taking into consideration -- an event -- T1 When it becomes, a laser beam exposure is started (ON). Moreover, it is a time of speed u maintaining U to stop a laser beam exposure (off), though natural. the event of a halt of a laser beam exposure -- T2 ** -- if it carries out -- Ts =T2-T1 it is .

[0016] By the way, migration of the exposure ideal point of a laser beam is started with a scanner, and it is T1. Since an exposure ideal point will move from an initial position (migration starting position) by the time it starts an exposure behind, the actual marking origin of the scale mark is biased from an initial position. namely, drawing 1 -- setting -- the left -- V-T1 only -- down -- usin theta -- time amount 0-T1 Only the value with which it integrated in the range about time amount is biased. However, to each scale mark, since this left and the amount of bias of each lower direction are always fixed, it is not necessary to take them into consideration at all for marking of a graduation uninfluential in the relative-position relation as the whole graduation.

[0017]

[Effect of the Invention] With the laser graduation attachment equipment concerning claim 1, a scanner operates by the control section, and since it moves in the direction of delivery speed V of the member which the exposure part of a laser beam should carry out graduation attachment, and the direction which makes an include angle theta with the speed of V/cos theta, to the member which should be carried out graduation attachment, marking of the scale mark is carried out to the direction of a graduation and right angle. Therefore, since frequent positioning of the member which can carry out marking of the scale mark in the direction of a graduation in the process continuously sent with fixed speed, and should be carried out graduation attachment thru/or frequent starting, and a halt become unnecessary, compaction of marking manday can be aimed at and reinforcement of member migration equipment can be attained.

[0018] With the laser graduation attachment equipment concerning claims 2 or 3 In the direction of delivery speed V of the member which a scanner should operate and the exposure part of a laser beam should carry out graduation attachment by the control section, and the direction which makes an include angle theta As opposed to the member which should be carried out graduation attachment since it moves with the speed of V/cos theta Marking of the scale mark is carried out at that direction of a graduation and right angle, and since this laser beam exposure is completed after the time amount according to the die length of the scale mark while a laser beam exposure is started, when it responds to the starting point location of the scale mark which should be carried out marking, automation concerning marking of the scale mark is supported. With the laser graduation attachment equipment concerning especially claim 3, since a position signal is outputted and a laser beam exposure is started corresponding to this signal when the member which should be carried out graduation attachment arrives at a predetermined location, the improvement in precision of a scale mark location is supported.

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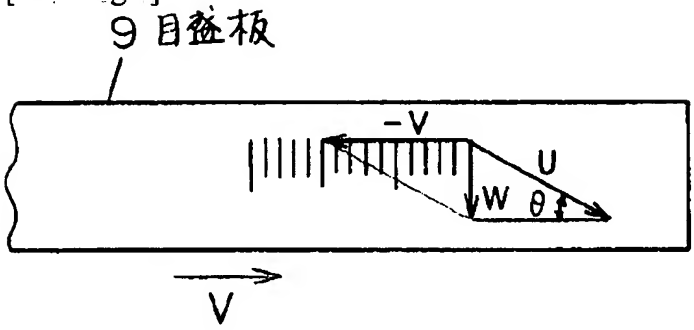
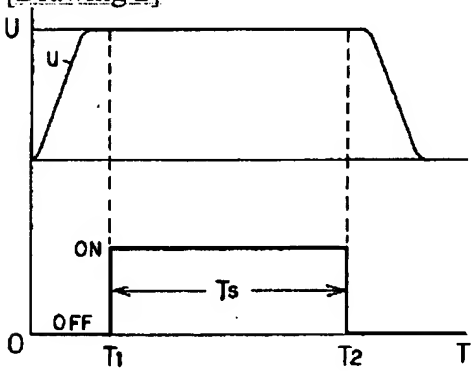
DRAWINGS

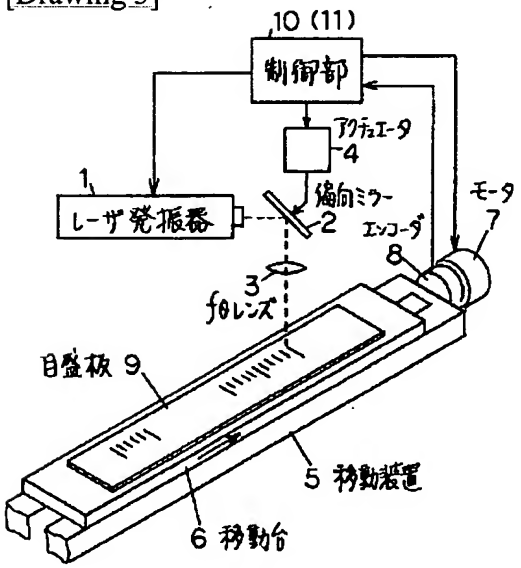
[Drawing 1]



[Drawing 2]



[Drawing 3]



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26/04		Ｚ 7920－4Ｅ		
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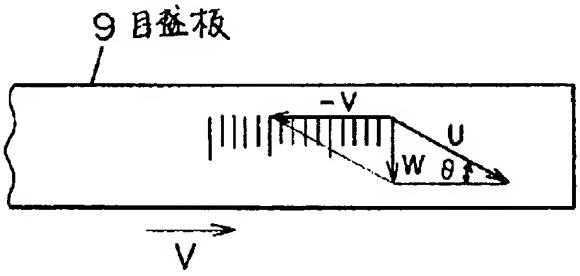
(54)【発明の名称】　レーザ目盛付け装置

(57)【要約】

【目的】マーキング工数の短縮、目盛板の位置決めの頻繁な繰返し、ないし頻繁な起動，停止をなくし、工数の短縮および目盛板用移動装置の長寿命化を図る。

【構成】目盛方向に一定速さで送られる目盛板９の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングする装置であって、レーザ光の照射箇所が、目盛板９の送り速さＶの方向と角度θをなす方向にＶ／cos θの速さで移動するようにスキャナを作動させ、かつマーキングすべき目盛線の始点位置に応じた時点にレーザ光照射を開始させると共に、このレーザ光照射を目盛線の長さに応じた時間の後に終了させる。



【特許請求の範囲】
【請求項１】目盛方向に一定速さで送られる目盛付けすべき部材の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングする装置であって、前記レーザ光の照射箇所が、前記部材の送り速さＶの方向と角度θをなす方向にＶ／cos θの速さで移動するように、前記スキャナを作動させる制御部を備えることを特徴とするレーザ目盛付け装置。
【請求項２】目盛方向に一定速さで送られる目盛付けすべき部材の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングする装置であって、前記レーザ光の照射箇所が、前記部材の送り速さＶの方向と角度θをなす方向にＶ／cos θの速さで移動するように、前記スキャナを作動させ、かつマーキングすべき目盛線の始点位置に応じた時点に前記レーザ光照射を開始させると共に、このレーザ光照射を前記目盛線の長さに応じた時間の後に終了させる制御部を備えることを特徴とするレーザ目盛付け装置。
【請求項３】請求項２に記載の装置において、レーザ光照射の開始時点は、目盛付けすべき部材が所定位置に到達したときに出力される位置信号に対応することを特徴とするレーザ目盛付け装置。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】この発明は、目盛方向に一定速さで送られるスケール部材の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングするレーザ目盛付け装置に関する。
【０００２】
【従来の技術】従来例について、後述の発明に係る実施例と共通な構成図である図３を参照しながら説明する。図３において、レーザ発振器１から出射されたレーザ光（ＹＡＧレーザ）は、アクチュエータ４によって、軸の回りに微小角度範囲で回動される偏向ミラー２を介して振られる。この振られたレーザ光は、ｆθレンズ３を通して目盛板９の表面に照射され、ここに目盛線をマーキングする。ここで、ｆθレンズ３は、特殊な集光レンズで、偏向ミラー２によって振られて比較的大きい角度で入射したレーザ光を、その入射角に応じて偏位した、目盛板９の表面箇所に合焦状態で照射させる。一方、移動装置５の移動台６が、モータ７によって駆動されて矢印方向に直進する構成をとり、この移動台６の上に目盛板９が固定される。この移動装置５は、いわゆるＸ軸テーブルである。また移動台６の位置、つまりモータ７の軸位置（回転角度）は、モータ７に連結されたエンコーダ８によって検出される。制御部１１は、目盛板９の目盛方向の送り位置と、レーザ光の出射の起動，停止と、偏向ミラー２の回動角度とを互いに関連付ける形で制御する。
【０００３】従来例では、移動台６が直進し、マーキングすべき目盛位置に応じた箇所に位置決めされた後に停止し、次に目盛線長に応じた角度だけ振られるレーザ光が目盛板９を照射し、対応する一つの目盛がマーキングされる。移動台６の位置決めは、エンコーダ８からの位置信号に基づく制御部１１の指令により、モータ７の回転角度が決められることによっておこなわれる。すなわち、移動台６ひいては目盛板９が、直進移動と位置決め停止とを繰り返しながら、その停止の都度、レーザ光が照射されてマーキングされる。もちろん、レーザ光の振れ方向は目盛線の方向と一致するから、目盛方向と直角である。
【０００４】
【発明が解決しようとする課題】従来例では、移動台６ひいては目盛板９が、直進移動と位置決め停止とを繰り返し、その停止時にレーザ光が照射されてマーキングされる。したがって、移動装置５は、その動きが直進移動，停止の頻繁な繰返しのため、一つには、各停止時の振動が静まるのを待つ時間が必要になるから、全作業工数が大きくなり、もう一つには、機械的な摩耗を起こしやすく寿命を短くするおそれがある、言いかえれば耐摩耗構造をとる必要がある。そこで、移動台６ひいては目盛板９の直進移動を連続的におこなう方式がとれれば、この問題が解決されることになる。
【０００５】この発明の課題は、従来の技術がもつ以上の問題点を解消し、スケール部材を各目盛位置で一時停止させることなく、目盛方向に一定速さで連続的に送る過程で、その表面にスキャナによって振られるレーザ光を照射して目盛線をマーキングするレーザ目盛付け装置を提供することにある。
【０００６】
【課題を解決するための手段】請求項１に係るレーザ目盛付け装置は、目盛方向に一定速さで送られる目盛付けすべき部材の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングする装置であって、前記レーザ光の照射箇所が、前記目盛付けすべき部材の送り速さＶの方向と角度θをなす方向にＶ／cos θの速さで移動するように、前記スキャナを作動させる制御部を備える。
【０００７】請求項２に係るレーザ目盛付け装置は、目盛方向に一定速さで送られる目盛付けすべき部材の表面に、スキャナによって振られるレーザ光を照射して目盛線をマーキングする装置であって、前記レーザ光の照射箇所が、前記目盛付けすべき部材の送り速さＶの方向と角度θをなす方向にＶ／cos θの速さで移動するように、前記スキャナを作動させ、かつマーキングすべき目盛線の始点位置に応じた時点に前記レーザ光照射を開始させると共に、このレーザ光照射を前記目盛線の長さに応じた時間の後に終了させる制御部を備える。
【０００８】請求項３に係るレーザ目盛付け装置は、請求項２に記載の装置において、レーザ光照射の開始時点

は、目盛付けすべき部材が所定位置に到達したときに出力される位置信号に対応する。

【０００９】

【作用】請求項１に係るレーザ目盛付け装置では、制御部によってスキャナが作動し、レーザ光の照射箇所が、目盛付けすべき部材の送り速さＶの方向と角度θをなす方向に、Ｖ／cos θの速さで移動するから、目盛付けすべき部材に対しては、その目盛方向と直角に目盛線がマーキングされる。

【００１０】請求項２または３に係るレーザ目盛付け装置では、制御部によってスキャナが作動し、レーザ光の照射箇所が、目盛付けすべき部材の送り速さＶの方向と角度θをなす方向に、Ｖ／cos θの速さで移動するから、目盛付けすべき部材に対しては、その目盛方向と直角に目盛線がマーキングされ、かつマーキングすべき目盛線の始点位置に応じた時点にレーザ光照射が開始されると共に、このレーザ光照射が目盛線の長さに応じた時間の後に終了するから、所望の位置，線長の目盛線が得られる。

【００１１】とくに請求項３に係るレーザ目盛付け装置では、目盛付けすべき部材が所定位置に到達したときに位置信号が出力され、この信号に対応してレーザ光照射が開始され、目盛線の始点位置が決まる。

【００１２】

【実施例】この発明に係るレーザ目盛付け装置の実施例について、以下に図を参照しながら説明する。この実施例が従来例と異なるのは、構成の面では、図３において、レーザ光が偏向ミラー２によって振られる方向が、目盛方向と直角ではなく、後述するような所定角度をなすことと、制御部１１の代わりに制御部１０が用いられることとである。また、実施例が従来例と動作の面で異なるのは、①目盛板９が連続的に一定の速さで送られる、②目盛板の送りの速さと、偏向ミラー２を振る速さと、振れ方向との間に所定の関係が成り立つ、③レーザ光出射のタイミングのとり方が規定される――などである。その他の点では、従来例と同様であるから、以下で説明は省略する。

【００１３】前記の項目②について、図１の実施例の動作を示す模式図を参照しながら説明する。図１において、目盛板９の右方向の送りの速さをＶ、レーザ光の照射点の移動方向が目盛板の送り方向となす角度をθとし、その移動速さをＵとしたときに、Ｕ＝Ｖ／cos θの関係が成り立つと、目盛板９に対するレーザ光の照射点の移動方向が目盛方向と直角になり、その照射点の目盛板９に対する相対的速さをＷとすると、Ｗ＝Ｕsin θとなる。言いかえれば、図１において、レーザ光の照射点の移動速度であるベクトル〔Ｕ〕と、見掛け上目盛板を静止させる（目盛板を基準とする）ために付加すべき補正速度としてのベクトル〔－Ｖ〕との合成が、目盛板に対する相対的なレーザ光照射点の移動速度であるベクトル〔Ｗ〕となる。

【００１４】したがって、ある目盛線をマーキングするときには、目盛板を速さＶで送る過程で、その目盛線の起点が到来したとき、レーザ光照射を起動させるとともに、Ｕ＝Ｖ／cos θを満足する方向角度θと、速さＵとでレーザ光の照射点の移動を開始させる。この照射点の移動を続け、次のような時間Ｔｓの後に照射を停止させる。Ｔｓ＝Ｌ／Ｗ＝Ｌ／Ｕsin θ（ここで、Ｌ：目盛線の長さ）

【００１５】実際には、レーザ光照射点の移動を開始しても瞬間的に速さＵに到達しない。図２は実施例におけるスキャナ作動とレーザ照射の関係を示すタイムチャートである。図２において、横軸に時間Ｔをとり、上側にレーザ光照射点（正確には、照射仮想点）の速さｕを、下側にレーザ光照射の起動，停止（オン・オフ）をとる。すなわち、速さｕは、Ｔ＝０から立ち上がり、Ｕに達するまで、図に示したように、ある時間遅れがあるから、若干の余裕を考慮して時点Ｔ1になったとき、レーザ光照射を起動（オン）させる。また、レーザ光照射を停止（オフ）させるのは、当然ながら速さｕがＵを維持しているときである。レーザ光照射を停止の時点をＴ２とすると、Ｔｓ＝Ｔ2－Ｔ1である。

【００１６】ところで、スキャナによってレーザ光の照射仮想点の移動を開始し、Ｔ1の後に照射を起動するまでに、初期位置（移動開始位置）から照射仮想点が移動するから、目盛線の実際のマーキング起点は初期位置から偏位する。すなわち図１において、左方向にＶ・Ｔ1だけ、下方向に、ｕsin θを時間０～Ｔ1の範囲で時間について積分した値だけ偏位する。しかし、この左，下の各方向の偏位量は、各目盛線に対して常に一定であるから、目盛全体としての相対位置関係には影響なく、目盛のマーキングにはなんら考慮する必要はない。

【００１７】

【発明の効果】請求項１に係るレーザ目盛付け装置では、制御部によってスキャナが作動し、レーザ光の照射箇所が、目盛付けすべき部材の送り速さＶの方向と角度θをなす方向に、Ｖ／cos θの速さで移動するから、目盛付けすべき部材に対しては、その目盛方向と直角に目盛線がマーキングされる。したがって、目盛方向に一定速さで連続的に送る過程で目盛線をマーキングすることができ、目盛付けすべき部材の頻繁な位置決め、ないし頻繁な起動，停止が不要になるため、マーキング工数の短縮が図れ、また部材移動装置の長寿命化が図れる。

【００１８】請求項２または３に係るレーザ目盛付け装置では、制御部によってスキャナが作動し、レーザ光の照射箇所が、目盛付けすべき部材の送り速さＶの方向と角度θをなす方向に、Ｖ／cos θの速さで移動するから、目盛付けすべき部材に対しては、その目盛方向と直角に目盛線がマーキングされ、かつマーキングすべき目盛線の始点位置に応じた時点にレーザ光照射が開始され

ると共に、このレーザ光照射が目盛線の長さに応じた時間の後に終了するから、目盛線のマーキングに係る自動化が支援される。とくに請求項３に係るレーザ目盛付け装置では、目盛付けすべき部材が所定位置に到達したときに位置信号が出力され、この信号に対応してレーザ光照射が開始されるから、目盛線位置の精度向上が支援される。

【図面の簡単な説明】

【図１】実施例の動作を示す模式図

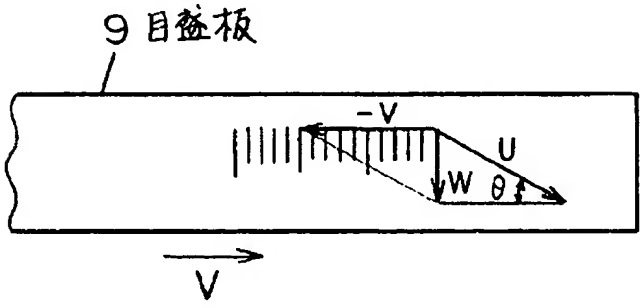
【図２】実施例におけるスキャナ作動とレーザ照射の関係を示すタイムチャート

【図３】本発明に係る実施例と従来例との共通な構成図

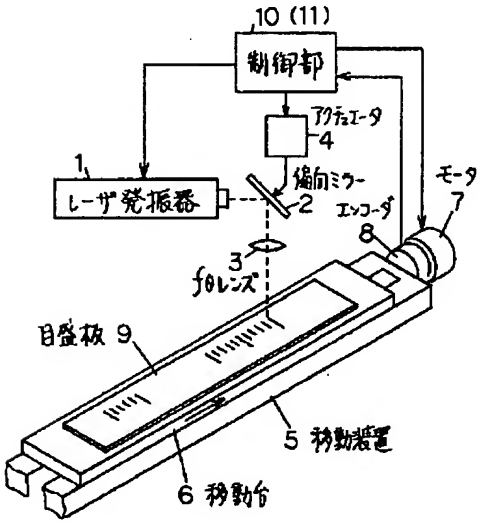
【符号の説明】

1	レーザ発振器
2	偏向ミラー
3	ｆθレンズ
4	アクチュエータ
5	移動装置
6	移動台
7	モータ
8	エンコーダ
9	スケール部材
１０	制御部
１１	制御部

【図１】



【図３】



【図２】